The quantum efficiency and stability of UV and soft X-ray photocathodes

The speaker: Anton S. Tremsin

Experimental Astrophysics Group
Space Sciences Laboratory
University of California, Berkeley
Berkeley , CA 94720.
Tel: (510) 642 4554 Fax: (510) 643 9729
e-mail: ast@ssl.berkeley.edu

Abstract:
The sensitivity of many detection devices depends on the efficiency of photocathodes used for the conversion of incoming photons into photoelectrons. The choice of photocathode material is determined by the spectral range where the sensitivity of the device is to be most important. Alkali halides are shown to be very efficient photocathodes in the ultraviolet and soft X-ray wavelength ranges and are widely used in many scientific applications. Although they are relatively stable under short exposure to atmosphere, which substantially simplifies production and handling of detection devices, it was found that their sensitivity can be substantially reduced by intense UV irradiation (photocathode's ageing). A detailed study of alkali halide photocathode efficiency and its ageing under intense UV and X-ray irradiation as well as some methods of increasing the stability will be presented. The quantum efficiency of amorphous diamond films were shown to be slightly lower than the efficiency of some alkali halide films, but the chemical and mechanical stability and yet to be confirmed radiation hardness of diamond photocathodes make them very attractive for many UV and soft X-ray applications. New materials such as GaN, AlGaN, GaAs are used to extend the sensitivity to longer wavelengths, but require in situ processing in very high vacuum.